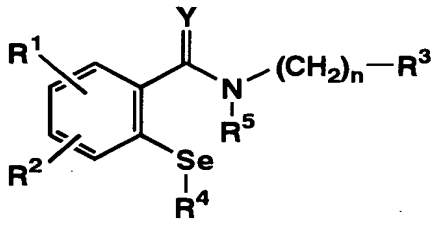
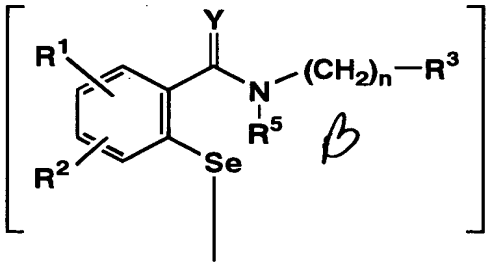
What is claimed is:

1. A substrate for thioredoxin reductase which comprises a substance selected from the group consisting of a compound represented by the following general formula (I) or (I') and a physiologically acceptable salt thereof, and a hydrate thereof and a solvate thereof:



(1)



(1')

wherein R^1 and R^2 independently represent a hydrogen atom, a halogen atom, a trifluoromethyl group, a nitro group, a C_1-C_6 alkyl group, or a C_1-C_6 alkoxyl group, or R^1 and R^2 may combine together to represent methylenedioxy group; R^3 represents an aryl group, an aromatic heterocyclic group, a 5- to 7-membered cycloalkyl group, or a 5- to 7-membered cycloalkenyl group, and the aryl group, the aromatic heterocyclic group, the cycloalkyl group, and the cycloalkenyl group may be substituted with one or more substituents; R^4 represents a hydrogen atom, a hydroxyl group, a -S-glutathione group, a -S-α-amino acid group, or an aralkyl group whose aryl moiety may be substituted with one or more substituents; R^5 represents a hydrogen atom or a C_1-C_6 alkyl group, or R^4 and R^5 may combine together to represent single bond; Y represents oxygen atom or sulfur atom; n represents an integer of from 0 to 5; and the selenium atom may be oxidized.

2. The substrate for thioredoxin reductase according to claim 1 which comprises a substance selected from the group consisting of 2-phenyl-1,2-benziso-

selenazol-3(2H)-one or a ring-opened form thereof and a physiologically acceptable salt thereof, and a hydrate thereof and a solvate thereof.

3. The substrate for thioredoxin reductase according to claim 1 or claim 2 which is reduced by thioredoxin reductase in the presence of NADPH.

4. An enhancer of the peroxidase activity of thioredoxin reductase which comprises a substance selected from the group consisting of the compound represented by the general formula (I) or (I') and the physiologically acceptable salt thereof, and the hydrate thereof and the solvate thereof according to claim 1.

5. The enhancer according to claim 4 which comprises a substance selected from the group consisting of 2-phenyl-1,2-benzisoselenazol-3(2H)-one or a ring-opened form thereof and a physiologically acceptable salt thereof, and a hydrate thereof and a solvate thereof.

6. A catalyst comprising a substance selected from the group consisting of the compound represented by the general formula (I) or (I') and the physiologically acceptable salt thereof, and the hydrate thereof and the solvate thereof according to claim 1 which oxidizes reduced thioredoxin in the peroxidase reaction proceeded by thioredoxin reductase.

7. A reducing agent comprising a substance selected from the group consisting of the compound represented by the general formula (I) or (I') and the physiologically acceptable salt thereof, and the hydrate thereof and the solvate thereof according to claim 1 which reduces a peroxide by oxidizing reduced thioredoxin in the peroxidase reaction proceeded by thioredoxin reductase.

8. An antioxidant comprising a substance selected from the group consisting of the compound represented by the general formula (I) or (I') and the physiologically acceptable salt thereof, and the hydrate thereof and the solvate thereof according to claim 1 which prevents peroxidation of a substance in vivo by oxidizing reduced thioredoxin in the peroxidase reaction proceeded by thioredoxin reductase.

9. A method for enhancing peroxidase activity of thioredoxin reductase in vivo which comprises the step of administering an effective amount of a substance selected from the group consisting of a compound represented by the general formula (I) or (I') and a physiologically acceptable salt thereof, and a hydrate thereof and a

solvate thereof according to claim 1 to a mammal including a human.

10. A method for reducing a peroxide in vivo which comprises the step of administering an effective amount of a substance selected from the group consisting of a compound represented by the general formula (I) or (I') and a physiologically acceptable salt thereof, and a hydrate thereof and a solvate thereof according to claim 1 to a mammal including a human.

11. A method for preventing peroxidation of a substance in vivo which comprises the step of administering an effective amount of a substance selected from the group consisting of a compound represented by the general formula (I) or (I') and a physiologically acceptable salt thereof, and a hydrate thereof and a solvate thereof to a mammal including a human.